

PCT INTERNATIONAL COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
 US Department of Commerce
 United States Patent and Trademark
 Office, PCT
 2011 South Clark Place Room
 CP2/5C24
 Arlington, VA 22202
 ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 08 March 2001 (08.03.01)	
International application No. PCT/AU00/00865	Applicant's or agent's file reference PCTPQ1740:MLT:LC
International filing date (day/month/year) 20 July 2000 (20.07.00)	Priority date (day/month/year) 20 July 1999 (20.07.99)
Applicant RUDAS, Tomasz	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:

15 February 2001 (15.02.01)

☐ in a notice effecting later election filed with the International Bureau on:2. The election ☒ was☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Claudio Borton
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

PC

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference PCT00865:MLT:HH	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416).	
International Application No. PCT/AU00/00865	International Filing Date (<i>day/month/year</i>) 20 July 2000	Priority Date (<i>day/month/year</i>) 20 July 1999
International Patent Classification (IPC) or national classification and IPC Int. Cl. ⁷ C05F 17/00, 17/02; C02F 3/30		
Applicant ORGANIC RESOURCE TECHNOLOGIES LTD et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 3 sheets, including this cover sheet.
☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 9 sheet(s).

3. This report contains indications relating to the following items:

- | | | |
|------|-------------------------------------|---|
| I | <input checked="" type="checkbox"/> | Basis of the report |
| II | <input type="checkbox"/> | Priority |
| III | <input type="checkbox"/> | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| IV | <input type="checkbox"/> | Lack of unity of invention |
| V | <input checked="" type="checkbox"/> | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| VI | <input type="checkbox"/> | Certain documents cited |
| VII | <input type="checkbox"/> | Certain defects in the international application |
| VIII | <input type="checkbox"/> | Certain observations on the international application |

Date of submission of the demand 15 February 2001	Date of completion of the report 10 September 2001
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustalia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer CHRISTINE BREMERS Telephone No. (02) 6283 2313

I. Basis of the report

1. With regard to the elements of the international application:*
- ☐ the international application as originally filed.
- ☒ the description, pages 1-21, as originally filed,
pages , filed with the demand,
pages , received on with the letter of
- ☒ the claims, pages , as originally filed,
pages , as amended (together with any statement) under Article 19,
pages , filed with the demand,
pages 22-30, received on 30 august 2001 with undated letter
- ☒ the drawings, pages 1/2-2/2, as originally filed,
pages , filed with the demand,
pages , received on with the letter of
- ☐ the sequence listing part of the description:
pages , as originally filed
pages , filed with the demand
pages , received on with the letter of
2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language which is:
- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).
3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:
- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished
4. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/fig.
5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1. Statement**

Novelty (N)	Claims 1-46	YES
	Claims	NO
Inventive step (IS)	Claims 1-46	YES
	Claims	NO
Industrial applicability (IA)	Claims 1-46	YES
	Claims	NO

2. Citations and explanations (Rule 70.7)**Novelty and Inventive Step**

D1 EP 755905

D2 Derwent Abstract Accession No 98-571533/49

D3 Derwent Abstract Accession No 99-012790/02

D4 Derwent Abstract Accession No. 95-363083/47

Claims 1-46 define an organic waste material treatment process for organic waste material received in one or more vessels and defines a single or plurality of vessels in terms of the said process.

D1 discloses an installation and process for the production of energy and of fertilisers from liquid and solid biomass, wherein anaerobic digestion and aerobic composting of the biomass is allowed to occur sequentially in the same reactor.

D2 describes a nitrogen content drainage processing method.

D3 describes a process cycle of intermittent aeration in an anaerobic process followed by removal of nitrogen and organic substances by membrane separation.

D4 describes treatment of polluted water by alternately forming an anaerobic state and an aerobic state for predetermined time intervals.

The present application comprises the following essential features which are not described in D1-D4: a first aerobic composting stage, even air distribution to the contents of the vessel and no agitation of the contents of the vessel.

Therefore claims 1-46 are novel and inventive in light of each of D1-D4.

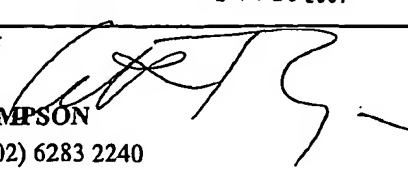
Industrial Applicability

The present application is to an organic waste treatment process and is therefore considered to have industrial applicability.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU01/01372

A. CLASSIFICATION OF SUBJECT MATTER																						
Int. Cl. ⁷ : C05F 1/02, 3/06, 9/02, 17/00, 17/02																						
According to International Patent Classification (IPC) or to both national classification and IPC																						
B. FIELDS SEARCHED																						
Minimum documentation searched (classification system followed by classification symbols) IPC 7: AS ABOVE																						
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched																						
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) WPIDS Search terms: Pressur? Positive(w), Aerat?, Seal?, Airtight(s), Enclose?, Closed																						
C. DOCUMENTS CONSIDERED TO BE RELEVANT																						
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.																				
X	FR 2502639 A (EGRETIER CIE SA) 1 October 1982 See claim 1 and figure 1.	1-15																				
X	DE 3802499 A (GEORG NEUMANN) 1 December 1988 See claim 1 and figure 1.	1-15																				
X	NL 8701118 A (JETSKE RUTTE GEB HOEKSTRA) 1 December 1988 See claim 1.	1-15																				
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C <input checked="" type="checkbox"/> See patent family annex																						
<p>* Special categories of cited documents:</p> <table border="0"> <tr> <td>"A"</td> <td>document defining the general state of the art which is not considered to be of particular relevance</td> <td>"T"</td> <td>later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</td> </tr> <tr> <td>"E"</td> <td>earlier application or patent but published on or after the international filing date</td> <td>"X"</td> <td>document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</td> </tr> <tr> <td>"L"</td> <td>document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</td> <td>"Y"</td> <td>document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</td> </tr> <tr> <td>"O"</td> <td>document referring to an oral disclosure, use, exhibition or other means</td> <td>"&"</td> <td>document member of the same patent family</td> </tr> <tr> <td>"P"</td> <td>document published prior to the international filing date but later than the priority date claimed</td> <td></td> <td></td> </tr> </table>			"A"	document defining the general state of the art which is not considered to be of particular relevance	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	"E"	earlier application or patent but published on or after the international filing date	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone	"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art	"O"	document referring to an oral disclosure, use, exhibition or other means	"&"	document member of the same patent family	"P"	document published prior to the international filing date but later than the priority date claimed		
"A"	document defining the general state of the art which is not considered to be of particular relevance	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention																			
"E"	earlier application or patent but published on or after the international filing date	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone																			
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art																			
"O"	document referring to an oral disclosure, use, exhibition or other means	"&"	document member of the same patent family																			
"P"	document published prior to the international filing date but later than the priority date claimed																					
Date of the actual completion of the international search 30 November 2001		Date of mailing of the international search report 24 DEC 2001																				
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustalia.gov.au Facsimile No. (02) 6285 3929		Authorized officer  GAVIN THOMPSON Telephone No : (02) 6283 2240																				

INTERNATIONAL SEARCH REPORT

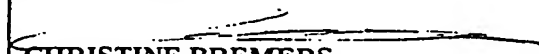
International application No.

PCT/AU01/01372

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	NL 9002891 A (GERARDUS HUBERT JOZEF VAN DAAL) 16 July 1992 See claim 1 and figure 1.	1-15
X	US 5457031 A (RONALD J. MASSE) 10 October 1995 See abstract, claim 1 and figure 1.	1-15
X	EP 0820425 B1 (FRESENIUS UMWELTECHNIK GMBH et al) 28 January 1998 See claims in English and figure on page 8.	1-15
X	Patent Abstracts of Japan, JP 09-057236 A (NOK CORP) 4 March 1997 See abstract.	1-15
X	WO 97/22570 A (HERHOF UMWELTECHNIK GMBH) 26 June 1997 See claim 1.	1-15
X	US 6065224 A (INTERLICENSE DEN HAAG BV) 23 May 2000 See abstract, figure 1 and claim 1.	1-15

INTERNATIONAL SEARCH REPORT

 International application No.
PCT/AU00/00865

A. CLASSIFICATION OF SUBJECT MATTER		
Int. Cl. C05F 17/00, 17/02; C02F 3/30		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols)		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) ORBIT: FILE WPAT. SEARCH TERMS: 1. C02F 3/30 2. C05F+ANAEROBIC+AEROBIC		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 755905 (Bertolotto, A) 29 January 1997 See whole document	1-62
X	Derwent Abstract Accession No 98-571533/49, Class D15, JP 10-249386 (NGK Insulators Ltd) 22 September 1998	1-62
X	Derwent Abstract Accession No 99-012790/02, Class D15, JP 10-277585 (Matsushita Electric Works Ltd) 20 October 1998	1-62
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C <input checked="" type="checkbox"/> See patent family annex		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 22 August 2000		Date of mailing of the international search report 6 SEP 2000
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustrialia.gov.au Facsimile No. (02) 6285 3929		Authorized officer  CHRISTINE BREMERS Telephone No.: (02) 6283 2313

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU00/00865

C (Continuation).

DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	Derwent Abstract Accession No. 95-363083/47, D15, JP 07-246395 (ZH Nihon Nogyo Shuraku Haisui Kyokai) 26 September 1995	1-62

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/AU00/00865

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member	
EP	755905	IT	1279184
END OF ANNEX			

PATENT COOPERATION TREATY

WO 01/05729
PCT/AU00/00865

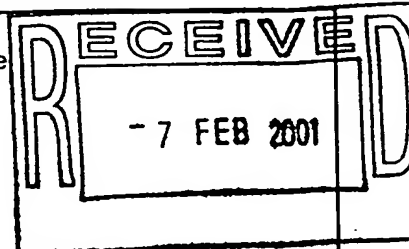
PCT

NOTICE INFORMING THE APPLICANT OF THE COMMUNICATION OF THE INTERNATIONAL APPLICATION TO THE DESIGNATED OFFICES

(PCT Rule 47.1(c), first sentence)

From the INTERNATIONAL BUREAU

To:
TURONEK, Mary, Louise
Lord & Company
4 Douro Place
West Perth, W.A. 6005
AUSTRALIE



Date of mailing (day/month/year) 25 January 2001 (25.01.01)		
Applicant's or agent's file reference PCTPQ1740:MLT:LC		IMPORTANT NOTICE
International application No. PCT/AU00/00865	International filing date (day/month/year) 20 July 2000 (20.07.00)	Priority date (day/month/year) 20 July 1999 (20.07.99)
Applicant ORGANIC RESOURCE TECHNOLOGIES LTD. et al		

1. Notice is hereby given that the International Bureau has communicated, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this Notice:
AU,KP,KR,US

In accordance with Rule 47.1(c), third sentence, those Offices will accept the present Notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

2. The following designated Offices have waived the requirement for such a communication at this time:
AE,AG,AL,AM,AP,AT,AZ,BA,BB,BG,BR,BY,BZ,CA,CH,CN,CR,CU,CZ,DE,DK,DM,DZ,EA,EE,EP,ES,
FI,GB,GD,GE,GH,GM,HR,HU,ID,IL,IN,IS,JP,KE,KG,KZ,LC,LK,LR,LS,LT,LU,LV,MA,MD,MG,MK,
MN,MW,MX,MZ,NO,NZ,OA,PL,PT,RO,RU,SD,SE,SG,SI,SK,SL,TJ,TM,TR,TT,TZ,UA,UG,UZ,VN,YU,
The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).
3. Enclosed with this Notice is a copy of the international application as published by the International Bureau on
25 January 2001 (25.01.01) under No. WO 01/05729

REMINDER REGARDING CHAPTER II (Article 31(2)(a) and Rule 54.2)

If the applicant wishes to postpone entry into the national phase until 30 months (or later in some Offices) from the priority date, a demand for international preliminary examination must be filed with the competent International Preliminary Examining Authority before the expiration of 19 months from the priority date.

It is the applicant's sole responsibility to monitor the 19-month time limit.

Note that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination.

REMINDER REGARDING ENTRY INTO THE NATIONAL PHASE (Article 22 or 39(1))

If the applicant wishes to proceed with the international application in the national phase, he must, within 20 months or 30 months, or later in some Offices, perform the acts referred to therein before each designated or elected Office.

For further important information on the time limits and acts to be performed for entering the national phase, see the Annex to Form PCT/IB/301 (Notification of Receipt of Record Copy) and Volume II of the PCT Applicant's Guide.

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer J. Zahra
Facsimile No. (41-22) 740.14.35	Telephone No. (41-22) 338.83.38

The demand must be filed directly with the competent International Preliminary Examining Authority or, if two or more Authorities are competent, with the one chosen by the applicant. The full name or two-letter code of that Authority may be indicated by the applicant on the line below:

IPEA/ _____

PCT

CHAPTER II

DEMAND

under Article 31 of the Patent Cooperation Treaty:
The undersigned requests that the international application specified below be the subject of international preliminary examination according to the Patent Cooperation Treaty and hereby elects all eligible States (except where otherwise indicated).

For International Preliminary Examining Authority use only	
Identification of IPEA	Date of receipt of DEMAND
Box No. I IDENTIFICATION OF THE INTERNATIONAL APPLICATION Applicant's or agent's file reference PCT00865:MLT:HH	
International application No. PCT/AU00/00865	International filing date (day/month/year) July 20, 2000 (20.07.00)
(Earliest) Priority date (day/month/year) July 20, 1999 (20.07.99)	
Title of invention "AN ORGANIC WASTE MATERIAL TREATMENT PROCESS"	
Box No. II APPLICANT(S)	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) ORGANIC RESOURCE TECHNOLOGIES LTD Unit 11, 4-8 Queen Street Bentley, Western Australia 6102 AUSTRALIA	
Telephone No.: (08) 9358 5444	
Facsimile No.: (08) 9451 1889	
Teleprinter No.:	
State (that is, country) of nationality: AUSTRALIA	State (that is, country) of residence: AUSTRALIA
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) RUDAS, TOMASZ Unit 11, 4-8 Queen Street Bentley, Western Australia 6102 AUSTRALIA	
State (that is, country) of nationality: AUSTRALIA	State (that is, country) of residence: AUSTRALIA
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)	
State (that is, country) of nationality:	
State (that is, country) of residence:	
<input type="checkbox"/> Further applicants are indicated on a continuation sheet.	

Box No. III AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The following person is ☒ agent ☐ common representativeand ☒ has been appointed earlier and represents the applicant(s) also for international preliminary examination.☐ is hereby appointed and any earlier appointment of (an) agent(s)/common representative is hereby revoked.☐ is hereby appointed, specifically for the procedure before the International Preliminary Examining Authority, in addition to the agent(s)/common representative appointed earlier.Name and address: *(Family name followed by given name; for a legal entity, full official designation.
The address must include postal code and name of country.)*TURONEK, Mary Louise
LORD & COMPANY
4 Douro Place
West Perth, Western Australia, 6005
AUSTRALIA

Telephone No.:

(08) 9481 1309

Facsimile No.:

(08) 9481 4705

Teleprinter No.:

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

Box No. IV BASIS FOR INTERNATIONAL PRELIMINARY EXAMINATION

Statement concerning amendments:*

1. The applicant wishes the international preliminary examination to start on the basis of:

☒ the international application as originally filed

the description

☐ as originally filed☐ as amended under Article 34

the claims

☐ as originally filed☐ as amended under Article 19 (together with any accompanying statement)☐ as amended under Article 34

the drawings

☐ as originally filed☐ as amended under Article 342. ☐ The applicant wishes any amendment to the claims under Article 19 to be considered as reversed.3. ☐ The applicant wishes the start of the international preliminary examination to be postponed until the expiration of 20 months from the priority date unless the International Preliminary Examining Authority receives a copy of any amendments made under Article 19 or a notice from the applicant that he does not wish to make such amendments (Rule 69.1(d)). *(This check-box may be marked only where the time limit under Article 19 has not yet expired.)*

* Where no check-box is marked, international preliminary examination will start on the basis of the international application as originally filed or, where a copy of amendments to the claims under Article 19 and/or amendments of the international application under Article 34 are received by the International Preliminary Examining Authority before it has begun to draw up a written opinion or the international preliminary examination report, as so amended.

Language for the purposes of international preliminary examination: ENGLISH☒ which is the language in which the international application was filed.☐ which is the language of a translation furnished for the purposes of international search.☐ which is the language of publication of the international application.☐ which is the language of the translation (to be) furnished for the purposes of international preliminary examination.

Box No. V ELECTION OF STATES

The applicant hereby elects all eligible States *(that is, all States which have been designated and which are bound by Chapter II of the PCT)*

excluding the following States which the applicant wishes not to elect:

Box No. VI CHECK LIST

The demand is accompanied by the following elements, in the language referred to in Box No. IV, for the purposes of international preliminary examination:

- | | | |
|--|---|--------|
| 1. translation of international application | : | sheets |
| 2. amendments under Article 34 | : | sheets |
| 3. copy (or, where required, translation) of amendments under Article 19 | : | sheets |
| 4. copy (or, where required, translation) of statement under Article 19 | : | sheets |
| 5. letter | : | sheets |
| 6. other (specify) | : | sheets |

For International Preliminary Examining Authority use only

received not received

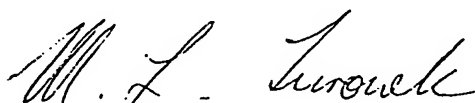
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

The demand is also accompanied by the item(s) marked below:

- | | |
|--|---|
| 1. <input checked="" type="checkbox"/> fee calculation sheet | 4. <input type="checkbox"/> statement explaining lack of signature |
| 2. <input type="checkbox"/> separate signed power of attorney | 5. <input type="checkbox"/> nucleotide and or amino acid sequence listing in computer readable form |
| 3. <input type="checkbox"/> copy of general power of attorney; reference number, if any: | 6. <input type="checkbox"/> other (specify): |

Box No. VII SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the demand).



TURONEK, MARY LOUISE (Agent)

For International Preliminary Examining Authority use only

1. Date of actual receipt of DEMAND:

2. Adjusted date of receipt of demand due to CORRECTIONS under Rule 60.1(b):

3. ☐ The date of receipt of the demand is AFTER the expiration of 19 months from the priority date and item 4 or 5, below, does not apply.

☐ The applicant has been informed accordingly.

4. ☐ The date of receipt of the demand is WITHIN the period of 19 months from the priority date as extended by virtue of Rule 80.5.

5. ☐ Although the date of receipt of the demand is after the expiration of 19 months from the priority date, the delay in arrival is EXCUSED pursuant to Rule 82.

For International Bureau use only

Demand received from IPEA on:

PATENT COOPERATION TREATY

From the:
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To: LORD & COMPANY 4 Douro Place WEST PERTH WA 6005	<div style="border: 2px solid black; padding: 10px; display: inline-block;"> <div style="font-size: 2em; font-weight: bold; letter-spacing: 5px;">RECEIVED</div> <div style="margin-top: 10px;">- 8 MAR 2001</div> </div>
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PCT

WRITTEN OPINION

(PCT Rule 66)

Date of mailing <i>(day/month/year)</i>		07 MAR 2001
Applicant's or agent's file reference pct00865:MLT:HH		REPLY DUE within TWO MONTHS from the above date of mailing
International Application No. PCT/AU00/00865	International Filing Date <i>(day/month/year)</i> 20 July 2000	Priority Date <i>(day/month/year)</i> 20 July 1999
International Patent Classification (IPC) or both national classification and IPC Int. Cl.⁷ C05F 17/00, 17/02; C02F 3/30		
Applicant ORGANIC RESOURCE TECHNOLOGIES LTD et al		

1.	This written opinion is the first drawn by this International Preliminary Examining Authority.
2.	This opinion contains indications relating to the following items:
I	<input checked="" type="checkbox"/> Basis of the opinion
II	<input type="checkbox"/> Priority
III	<input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
IV	<input type="checkbox"/> Lack of unity of invention
V	<input checked="" type="checkbox"/> Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
VI	<input type="checkbox"/> Certain documents cited
VII	<input type="checkbox"/> Certain defects in the international application
VIII	<input checked="" type="checkbox"/> Certain observations on the international application
The applicant is hereby invited to reply to this opinion. <div style="margin-left: 20px;"> When? See the time limit indicated above. The applicant may, before the expiration of that time limit, request this Authority to grant an extension, see Rule 66.2(d). How? By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9. Also For an additional opportunity to submit amendments, see Rule 66.4. For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4bis. For an informal communication with the examiner, see Rule 66.6. If no reply is filed, the international preliminary examination report will be established on the basis of this opinion. </div>	
4.	The final date by which the international preliminary examination report must be established according to Rule 69.2 is: 20 November 2001

Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustalia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer <div style="text-align: center;"> </div> CHRISTINE BREMERS Telephone No. (02) 6283 2313
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I. Basis of the opinion

1. With regard to the elements of the international application:*

- ☒ the international application as originally filed.
- ☐ the description, pages , as originally filed,
 pages , filed with the demand,
 pages , received on with the letter of
- ☐ the claims, pages , as originally filed,
 pages , as amended under Article 19,
 pages , filed with the demand,
 pages , received on with the letter of
- ☐ the drawings, pages , as originally filed,
 pages , filed with the demand,
 pages , received on with the letter of
- ☐ the sequence listing part of the description:
 pages , as originally filed
 pages , filed with the demand
 pages , received on with the letter of

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the written opinion was drawn on the basis of the sequence listing:

- ☐ contained in the international application in printed form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/fig.

5. ☐ This opinion has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

** Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed"*

V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	YES
	Claims 1-62	NO
Inventive step (IS)	Claims	YES
	Claims 1-62	NO
Industrial applicability (IA)	Claims 1-62	YES
	Claims	NO

2. Citations and explanations

Novelty and Inventive Step

D1 EP 755905

D2 Derwent Abstract Accession No 98-571533/49

D3 Derwent Abstract Accession No 99-012790/02

D4 Derwent Abstract Accession No. 95-363083/47

1. Claim 1 defines an organic waste material treatment process that takes place in a single vessel which process comprises anaerobic digestion followed by aerobic digestion.

D1-D4 each disclose this process.

Claims 2-22 are appended to claim 1 and define variations in temperature, pressure and moisture; addition of anaerobic inoculum; and aerobic stabilisation of the compost.

D1 also discloses varying the temperature; addition of anaerobic inoculum; and aerobic stabilisation.

It is well known in the art to vary conditions of pressure and moisture so as to obtain the optimum result.

So claims 2-22 do not add any features which contribute to the novelty or inventive step of claim 1.

Therefore claims 1-22 are considered not novel and not inventive in light of D1-D4.

2. Claim 23 discloses multiple interconnecting vessels where the process of claim 1 occurs in each vessel and the water from steps a) to c) in the first vessel is transferred for use in steps a) to c) in the second vessel. Then the water goes into the next vessel and so on.

D1 at claims 1 and 4 discloses a number of vessels that are interconnected and recycle water.

Claims 24-44 are appended to claim 23 and define variations in temperature, pressure and moisture; addition of anaerobic inoculum; and aerobic stabilisation of the compost. To vary conditions so as to obtain the optimum result, is well known in the art. So claims 24-44 do not add any features which contribute to

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

1. Claims 45-62 are not supported by the description because they are not limited to the process of the invention.

Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of BOX V

Therefore claims 23-44 are considered not novel and not inventive in light of D1-D4.

3. Claims 45-53 define a vessel which is not limited to its use in the process of claims 1-22. But, in keeping within the framework of the invention, the search and this examination has been limited to the vessel in relation to the present process.

Claims 54-62 define "an apparatus" which is a plurality of vessels suitable for the process of claims 23-44 but not limited to the process of claims 23-44.

The features (for example a "first feed means for supplying water") of the claimed vessel and apparatus are well known in the art and would be considered in the building of any waste treatment vessel or apparatus. A bucket or a watering or a laundry trough would fit the definition of the vessel of claim 45.

Therefore claims 45-62 are considered not novel and not inventive.

Industrial Applicability

The invention as defined in claims 1-62 relates to a process, vessel and apparatus for treatment of organic waste and therefore satisfies the criterion of industrial applicability.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU00/00865

A. CLASSIFICATION OF SUBJECT MATTERInt. Cl. ⁷: C05F 17/00, 17/02; C02F 3/30

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

ORBIT: FILE WPAT. SEARCH TERMS: 1. C02F 3/30

2. C05F+ANAEROBIC+AEROBIC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 755905 (Bertolotto, A) 29 January 1997 See whole document	1-62
X	Derwent Abstract Accession No 98-571533/49, Class D15, JP 10-249386 (NGK Insulators Ltd) 22 September 1998	1-62
X	Derwent Abstract Accession No 99-012790/02, Class D15, JP 10-277585 (Matsushita Electric Works Ltd) 20 October 1998	1-62

☒ Further documents are listed in the continuation of Box C
 ☒ See patent family annex

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

22 August 2000

Date of mailing of the international search report

6 SEP 2000

Name and mailing address of the ISA/AU

AUSTRALIAN PATENT OFFICE
PO BOX 200, WODEN ACT 2606, AUSTRALIA
E-mail address: pct@ipaustalia.gov.au
Facsimile No. (02) 6285 3929

Authorized officer

CHRISTINE BREMERS

Telephone No : (02) 6283 2313

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU00/00865

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	Derwent Abstract Accession No. 95-363083/47, D15, JP 07-246395 (ZH Nihon Nogyo Shuraku Haisui Kyokai) 26 September 1995	1-62

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference PCTPQ1740:MLT:LC	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/AU00/00865	International filing date (<i>day/month/year</i>) 20 July 2000	(Earliest) Priority Date (<i>day/month/year</i>) 20 July 1999
Applicant ORGANIC RESOURCE TECHNOLOGIES LTD et al		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 4 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

Basis of the report

- a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).
- b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.
☐ Certain claims were found unsearchable (See Box I).
3. ☐ Unity of invention is lacking (See Box II).
4. With regard to the title,

☒ the text is approved as submitted by the applicant.
☐ the text has been established by this Authority to read as follows:
5. With regard to the abstract,

☒ the text is approved as submitted by the applicant
☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. The figure of the drawings to be published with the abstract is Figure No.

☐ as suggested by the applicant.
☐ because the applicant failed to suggest a figure
☐ because this figure better characterizes the invention

☒ None of the figures

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/AU00/00865

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member	
EP	755905	IT	1279184
END OF ANNEX			

PCT

REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only

International Application No.

International Filing Date

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference
(if desired) (12 characters maximum) PCTPQ1740:MLT:LC

Box No. I TITLE OF INVENTION

AN ORGANIC WASTE MATERIAL TREATMENT PROCESS

Box No. II APPLICANT

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

ORGANIC RESOURCE TECHNOLOGIES LTD
UNIT 11, 4-8 QUEEN STREET
BENTLEY, WESTERN AUSTRALIA 6102
AUSTRALIA

☐ This person is also inventor.

Telephone No.

(08) 9358 5444

Facsimile No.

(08) 9451 1889

Teleprinter No.

State (that is, country) of nationality:

AUSTRALIA

State (that is, country) of residence:

AUSTRALIA

This person is applicant for the purposes of:

☐

all designated States

☒

all designated States except the United States of America

☐

the United States of America only

☐

the States indicated in the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

RUDAS, TOMASZ
UNIT 11 4-8 QUEEN STREET
BENTLEY, WESTERN AUSTRALIA, 6102
AUSTRALIA

This person is:

☐ applicant only

☒ applicant and inventor

☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

AUSTRALIA

State (that is, country) of residence:

AUSTRALIA

This person is applicant for the purposes of:

☐

all designated States

☐

all designated States except the United States of America

☒

the United States of America only

☐

the States indicated in the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:

☒

agent

☐

common representative

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

TURONEK, MARY LOUISE
LORD & COMPANY
4 DOURO PLACE
WEST PERTH, WESTERN AUSTRALIA, 6005
AUSTRALIA

Telephone No.

(08) 9481 1309

Facsimile No.

(08) 9481 4705

Teleprinter No.

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

Box No.V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):

Regional Patent

- ☒ AP ARIPO Patent: GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, MZ Mozambique, SD Sudan, SL Sierra Leone, SZ Swaziland, TZ United Republic of Tanzania, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☒ EA Eurasian Patent: AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ EP European Patent: AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☒ OA OAPI Patent: BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line)

National Patent (if other kind of protection or treatment desired, specify on dotted line):

- | | |
|--|--|
| <input checked="" type="checkbox"/> AE United Arab Emirates | <input checked="" type="checkbox"/> LC Saint Lucia |
| <input checked="" type="checkbox"/> AG Antigua and Barbuda | <input checked="" type="checkbox"/> LK Sri Lanka |
| <input checked="" type="checkbox"/> AL Albania | <input checked="" type="checkbox"/> LR Liberia |
| <input checked="" type="checkbox"/> AM Armenia | <input checked="" type="checkbox"/> LS Lesotho |
| <input checked="" type="checkbox"/> AT Austria | <input checked="" type="checkbox"/> LT Lithuania |
| <input checked="" type="checkbox"/> AU Australia | <input checked="" type="checkbox"/> LU Luxembourg |
| <input checked="" type="checkbox"/> AZ Azerbaijan | <input checked="" type="checkbox"/> LV Latvia |
| <input checked="" type="checkbox"/> BA Bosnia and Herzegovina | <input checked="" type="checkbox"/> MA Morocco |
| <input checked="" type="checkbox"/> BB Barbados | <input checked="" type="checkbox"/> MD Republic of Moldova |
| <input checked="" type="checkbox"/> BG Bulgaria | <input checked="" type="checkbox"/> MG Madagascar |
| <input checked="" type="checkbox"/> BR Brazil | <input checked="" type="checkbox"/> MK The former Yugoslav Republic of Macedonia |
| <input checked="" type="checkbox"/> BY Belarus | <input checked="" type="checkbox"/> MN Mongolia |
| <input checked="" type="checkbox"/> BZ Belize | <input checked="" type="checkbox"/> MW Malawi |
| <input checked="" type="checkbox"/> CA Canada | <input checked="" type="checkbox"/> MX Mexico |
| <input checked="" type="checkbox"/> CH and LI Switzerland and Liechtenstein | <input checked="" type="checkbox"/> MZ Mozambique |
| <input checked="" type="checkbox"/> CN China | <input checked="" type="checkbox"/> NO Norway |
| <input checked="" type="checkbox"/> CR Costa Rica | <input checked="" type="checkbox"/> NZ New Zealand |
| <input checked="" type="checkbox"/> CU Cuba | <input checked="" type="checkbox"/> PL Poland |
| <input checked="" type="checkbox"/> CZ Czech Republic | <input checked="" type="checkbox"/> PT Portugal |
| <input checked="" type="checkbox"/> DE Germany | <input checked="" type="checkbox"/> RO Romania |
| <input checked="" type="checkbox"/> DK Denmark | <input checked="" type="checkbox"/> RU Russian Federation |
| <input checked="" type="checkbox"/> DM Dominica | <input checked="" type="checkbox"/> SD Sudan |
| <input checked="" type="checkbox"/> DZ Algeria | <input checked="" type="checkbox"/> SE Sweden |
| <input checked="" type="checkbox"/> EE Estonia | <input checked="" type="checkbox"/> SG Singapore |
| <input checked="" type="checkbox"/> ES Spain | <input checked="" type="checkbox"/> SI Slovenia |
| <input checked="" type="checkbox"/> FI Finland | <input checked="" type="checkbox"/> SK Slovakia |
| <input checked="" type="checkbox"/> GB United Kingdom | <input checked="" type="checkbox"/> SL Sierra Leone |
| <input checked="" type="checkbox"/> GD Grenada | <input checked="" type="checkbox"/> TJ Tajikistan |
| <input checked="" type="checkbox"/> GE Georgia | <input checked="" type="checkbox"/> TM Turkmenistan |
| <input checked="" type="checkbox"/> GH Ghana | <input checked="" type="checkbox"/> TR Turkey |
| <input checked="" type="checkbox"/> GM Gambia | <input checked="" type="checkbox"/> TT Trinidad and Tobago |
| <input checked="" type="checkbox"/> HR Croatia | <input checked="" type="checkbox"/> TZ United Republic of Tanzania |
| <input checked="" type="checkbox"/> HU Hungary | <input checked="" type="checkbox"/> UA Ukraine |
| <input checked="" type="checkbox"/> ID Indonesia | <input checked="" type="checkbox"/> UG Uganda |
| <input checked="" type="checkbox"/> IL Israel | <input checked="" type="checkbox"/> US United States of America |
| <input checked="" type="checkbox"/> IN India | <input checked="" type="checkbox"/> UZ Uzbekistan |
| <input checked="" type="checkbox"/> IS Iceland | <input checked="" type="checkbox"/> VN Viet Nam |
| <input checked="" type="checkbox"/> JP Japan | <input checked="" type="checkbox"/> YU Yugoslavia |
| <input checked="" type="checkbox"/> KE Kenya | <input checked="" type="checkbox"/> ZA South Africa |
| <input checked="" type="checkbox"/> KG Kyrgyzstan | <input checked="" type="checkbox"/> ZW Zimbabwe |
| <input checked="" type="checkbox"/> KP Democratic People's Republic of Korea | |
| <input checked="" type="checkbox"/> KR Republic of Korea | |
| <input checked="" type="checkbox"/> KZ Kazakhstan | |

Check-box reserved for designating States which have become party to the PCT after issuance of this sheet:

☐

Precautionary Designation Statement: In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation (including fees) must reach the receiving Office within the 15-month time limit.)

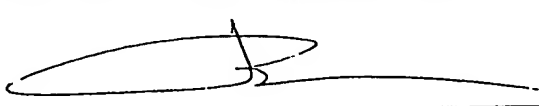

Box No. VI PRIORITY CLAIM		<input type="checkbox"/> Further priority claims are indicated in the Supplemental Box.		
Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is:		
		national application: country	regional application: regional Office	international application: receiving Office
item (1) 20/7/99	PQ1740	AUSTRALIA		
item (2)				
item (3)				

☒ The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office) identified above as item(s): 1

* Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.

Box No. VII INTERNATIONAL SEARCHING AUTHORITY			
Choice of International Searching Authority (ISA) (if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):		Request to use results of earlier search; reference to that search (if an earlier search has been carried out by or requested from the International Searching Authority):	
ISA /		Date (day/month/year)	Number Country (or regional Office)

Box No. VIII CHECK LIST; LANGUAGE OF FILING	
This international application contains the following number of sheets: request : 3 description (excluding sequence listing part) : 21 claims : 12 abstract : 1 drawings : 2 sequence listing part of description : _____ Total number of sheets : 39	This international application is accompanied by the item(s) marked below: 1. <input checked="" type="checkbox"/> fee calculation sheet 2. <input type="checkbox"/> separate signed power of attorney 3. <input type="checkbox"/> copy of general power of attorney; reference number, if any: 4. <input type="checkbox"/> statement explaining lack of signature 5. <input type="checkbox"/> priority document(s) identified in Box No. VI as item(s): 6. <input type="checkbox"/> translation of international application into (language): 7. <input type="checkbox"/> separate indications concerning deposited microorganism or other biological material 8. <input type="checkbox"/> nucleotide and/or amino acid sequence listing in computer readable form 9. <input type="checkbox"/> other (specify):
Figure of the drawings which should accompany the abstract: <u>1</u>	Language of filing of the international application: <u>ENGLISH</u>

Box No. IX SIGNATURE OF APPLICANT OR AGENT	
<small>Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).</small>	
 ORGANIC RESOURCE TECHNOLOGIES LTD RUDAS, RYSZARD, DIRECTOR	 RUDAS, TOMASZ, INVENTOR

For receiving Office use only	
1. Date of actual receipt of the purported international application: 3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application: 4. Date of timely receipt of the required corrections under PCT Article 11(2): 5. International Searching Authority (if two or more are competent): <u>ISA /</u>	2. Drawings: <input type="checkbox"/> received: <input type="checkbox"/> not received: 6. <input type="checkbox"/> Transmittal of search copy delayed until search fee is paid.

For International Bureau use only	
Date of receipt of the record copy by the International Bureau:	

Form PCT/RO/101 (last sheet) (July 1998; reprint January 2000) See Notes to the request form

10/031,421

096732970

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
25 January 2001 (25.01.2001)

PCT

(10) International Publication Number
WO 01/05729 A1

- (51) International Patent Classification⁷: C05F 17/00, 17/02, C02F 3/30
- (74) Agent: TURONEK, Mary, Louise; Lord & Company, 4 Douro Place, West Perth, W.A. 6005 (AU).
- (21) International Application Number: PCT/AU00/00865
- (22) International Filing Date: 20 July 2000 (20.07.2000)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
PQ 1740 20 July 1999 (20.07.1999) AU
- (71) Applicant (for all designated States except US): **ORGANIC RESOURCE TECHNOLOGIES LTD.**
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- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
- Published:
— With international search report.
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- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: AN ORGANIC WASTE MATERIAL TREATMENT PROCESS

(57) Abstract: An organic waste material treatment process comprising subjecting the organic waste material to conditions under which anaerobic digestion occurs followed by conditions under which aerobic composting occurs. Preferably, the organic waste material is pre-conditioned before anaerobic digestion by subjecting the organic waste material to aerobic composting conditions to facilitate a rise in temperature of the organic waste material. The treatment process is conducted in a single vessel, wherein air and water are evenly distributed to the contents of the vessel. A plurality of vessels may be interconnected, such that water may be extracted from one vessel, whose contents have undergone anaerobic digestion, then recirculated to an interconnected vessel to facilitate conditions for anaerobic digestion of the contents of the interconnected vessel.

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APR 17 2002
TC 1700

WO 01/05729 A1

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TITLE

“AN ORGANIC WASTE MATERIAL TREATMENT PROCESS”

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FIELD OF THE INVENTION

The present invention relates to an organic waste material treatment process.

BACKGROUND OF THE INVENTION

It is well known that degradation of solid organic waste material to a bioactive, stabilised
10 end product such as compost for gardens, can be achieved by treating the solid organic
waste material under either anaerobic or aerobic conditions in which anaerobic or aerobic
microorganisms, respectively, metabolise the waste material to the end product.

Aerobic decomposition of solid organic waste material takes place in the presence of
oxygen. Energy produced during aerobic decomposition is released as heat, the
15 temperature of the material frequently rising to 75°C under ambient conditions. The
resulting solid end product is generally rich in nitrates which is a readily bioavailable
source of nitrogen for plants. Thus the bio-available resultant end product is an excellent
fertilising material for gardens and has commercial value as such.

Anaerobic digestion of solid organic waste takes place in the absence of oxygen.
20 Typically, the solid organic waste must be heated to a mesophilic or thermophilic
temperature range in order for anaerobic microbial metabolism to be optimised. Energy
produced during anaerobic digestion is conserved as biogas, predominantly methane and
carbon dioxide. The resultant solid end product is generally rich in ammonium salts.

Ammonium salts are not readily bio-available for uptake by plants. It is known, therefore, to treat residues, resulting from anaerobic digestion, with conditions under which aerobic decomposition will proceed. Thus, the material is converted to one rich in nitrates and which is of commercial value.

- 5 Systems have generally been designed to cater discretely for each type of degradation, although some systems have been designed to combine both anaerobic and aerobic decomposition processes.

German Patent Number 4440750 relates to an apparatus for raw material and energy recovery from biomass which has an anaerobic fermentation unit, an aerobic composting
10 unit, a gasification unit and a power generating plant. The apparatus utilises byproducts from the anaerobic fermentation unit and the aerobic composting unit to work synergistically to provide reduced amounts of residues and to improve raw material and energy production.

International Patent Application Number WO 94/24071 discloses treatment of organic
15 bioresidues especially from municipal and industrial wastes, including raw and/or cooked food residues, agricultural wastes and/or plant vegetable components. The bioresidues are first homogenised, fermented in an anaerobic reactor wherein the resulting biogas is removed, and then the residual solids are transferred to a composting chamber.

These and other similar systems provide discrete and separate chambers or vessels for
20 aerobic decomposition and anaerobic digestion, respectively. Material which has undergone one set of conditions is transferred to a separate location to undergo a secondary processing phase. The transfer of material from one location to another is not efficient in terms of time, costs and labour.

The present invention seeks to overcome, at least in part, some of the aforementioned disadvantages.

SUMMARY OF THE INVENTION

5 In accordance with a first aspect of the present invention there is provided an organic waste material treatment process for organic waste material received in a vessel comprising the steps of:

- a) displacing air in the vessel and contents thereof with water to create conditions suitable for anaerobic digestion of the contents to proceed;
- 10 b) anaerobically digesting the contents of the vessel by action of anaerobic bacteria;
- c) separating gaseous byproducts from residues resulting from step b);
- d) removing at least a portion of the water from the vessel;
- e) administering air to the residues in the vessel to create conditions suitable for aerobic composting of the residues to proceed;
- 15 f) aerobically composting the residues by action of aerobic bacteria; and
- g) recovering compost resulting from step f) from the vessel.

In accordance with a second aspect of the present invention there is provided an organic waste material treatment process for organic waste material received in a plurality of interconnected vessels comprising the steps of:

- 20 a) displacing air in at least one of the vessels and contents thereof with water received from an interconnected vessel to create conditions suitable for anaerobic digestion of the contents to proceed in the or each vessel, the contents of the interconnected vessel having already undergone anaerobic digestion;

- b) anaerobically digesting the contents of the or each vessel;
- c) separating gaseous byproducts from residues resulting from step b);
- d) removing at least a portion of the water from the or each vessel and transferring the portion of the water to another interconnected vessel for use in step a);
- 5 e) administering air to the residues in the or each vessel to create conditions suitable for aerobic composting of the residues to proceed;
- f) aerobically composting the residues; and
- g) recovering compost resulting from step f) from the or each vessel.

10 In accordance with a third aspect of the present invention there is provided a vessel for anaerobic digestion and aerobic composting of organic waste material comprising a means for receiving organic waste material, first feed means for supplying water to the vessel and second feed means for supplying air to the vessel, wherein the first and second feed means are arranged to evenly distribute water and air to the organic waste material; the vessel being devoid of any internal agitation means.

15 In accordance with a fourth aspect of the present invention there is provided an apparatus arranged , in use, to facilitate an organic waste material treatment process, comprising at least one vessel for sequential anaerobic digestion and aerobic composting of organic waste material, a first recirculation means for recirculating gases extracted from the or each vessel to a first storage means and a second recirculation means for recirculating
20 water extracted from the or each vessel to a second storage means or an interconnected vessel, wherein the organic waste material in the interconnected vessel is undergoing anaerobic digestion.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:-

Figure 1 is a schematic diagram of an apparatus, arranged in use, to house organic waste material and to facilitate therein a sequential decomposition process comprising an anaerobic digestion stage and an aerobic composition stage, in accordance with the present invention; and

Figure 2 is a schematic diagram of a plurality of vessels shown in Figure 1, interconnected by a first and second recirculation means, wherein each vessel is arranged, in use, to house organic waste material and to facilitate a sequential decomposition process therein, and the first and second recirculation means is arranged, in use, to recirculate byproducts from each vessel to an adjoining vessel in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

In Figure 1 of the accompanying drawings there is shown an apparatus 10, arranged in use, to house organic waste material and to facilitate a sequential decomposition process, comprising an anaerobic digestion stage and an aerobic composting stage, therein.

The apparatus 10 includes an air tight pressurised vessel 20, arranged, in use, to house organic waste material. Preferably, the vessel 20 is constructed from a rigid, chemically inert material with good structural integrity such as steel or concrete. Preferably, the vessel 20 operates in a pressure range of between about 1-1000 kPa above atmospheric pressure.

An uppermost wall 22 of the vessel 20 is provided with a receival hatch 24 which is arranged in use to remain in an open position when organic waste material is loaded or unloaded from the vessel 20. The receival hatch 24 is arranged in use to remain in a closed position when the organic waste material is undergoing the sequential decomposition process.

The organic waste material may be loaded into the vessel 20 by an auger loader 30 and a belt conveyor 40 as shown in Figure 1. It will be appreciated, however, that any convenient conveying and loading system may be used to load the vessel 20 with organic waste material.

The vessel 20 is also provided with an extraction hatch 27 which is disposed in a wall 21 of the vessel 20. The extraction hatch 27 is arranged in use to remain in an open position when an end product of the sequential decomposition process is unloaded from the vessel. The extraction hatch 27 is arranged in use to remain in a closed position during the sequential decomposition process.

The vessel 20 is provided with a plurality of feeder lines 26 which are arranged, in use, to deliver air or water to the vessel 20. It is envisaged that air will be delivered to the vessel 20 under a positive pressure of between about 1-1000 kPa above atmospheric pressure. It has been found that operating air pressures inside the vessel of about between 1-1000 kPa above atmospheric pressure facilitate a more efficient air penetration and distribution of air into the material contents of the vessel 20. The feeder lines 26 are also arranged to drain the vessel 20 of excess water under negative pressure. The feeder lines 26 are disposed in at least one wall 21 of the vessel 20 such that the water or the air is evenly distributed in the organic waste material housed by the vessel 20. The even distribution of

water or air eliminates the necessity for an agitation means within the vessel 20 to homogenise conditions therein. It is envisaged, however, that in the case of a large industrial scale operation where the volume of the vessel 20 is very large, it may be more convenient to install an agitation means within the vessel 20 to assist homogenise conditions therein

The feeder lines 26 are connected with a control line 28 which is arranged to control the flow and distribution of water and air to and from the vessel 20 at appropriate stages of the sequential decomposition process.

In an alternative embodiment of the invention the vessel 20 is provided with at least one elongate perforated lance which is also arranged in use to deliver air or water to the vessel 20 in a similar manner to the feeder lines 26. It is envisaged that the perforations will be equidistantly spaced apart from one another over the length of the lance in order to promote even distribution of air and water into the vessel 20. The lance is arranged to depend from the uppermost wall 22 or the lowermost wall 21 of the vessel 20. The vessel 20 is additionally provided with a drainage means to drain excess water from the vessel 20 under negative pressure.

The apparatus 10 is provided with a first and a second recirculation lines 62, 64. The first recirculation line 62 is provided with a first pump 61 which is arranged to facilitate recirculation of gas through the apparatus 10. Air from an external source may also be received into the first recirculation line 62 via a first port 65. The second recirculation line 64 is provided with a second pump 63 which is arranged to facilitate recirculation of water through the apparatus 10. Water from an external source may also be received into the second recirculation line 64 via a second port 66. The second port 66 is also arranged

to receive biological or chemical additives, such as a bacterial inoculum, enzymes and pH buffers.

The first and second recirculation lines 62, 64 are interconnected with the vessel 20 by the control line 28 and the feeder lines 26.

5 The uppermost wall 22 of the vessel 20 is also provided with a gas extraction line. The gas extraction line 50 interconnects the vessel 20 and a de-watering tank 60. The gas extraction line 50 is arranged, in use, to extract gases generated in the interior of the vessel 20 during an anaerobic digestion stage of the sequential decomposition process, or to extract air from the head space of the vessel 20 during an aerobic composting stage of
10 the sequential decomposition process.

The de-watering tank 60 is arranged, in use, to remove water from the extracted gases.

The de-watering tank 60 is connected with the first recirculation lines 62 and a de-watering line 67. In this way, the first recirculation line 62 facilitates the recirculation of de-watered gas through the apparatus 10. The de-watering line 67 is arranged in use to
15 recirculate the water which has been removed from the gas through the apparatus 10.

The de-watering line 67 is connected to the second recirculation line 64.

The apparatus 10 is provided with a biofilter 70 which is interconnected with the first recirculation line 62 by an exit line 72. The biofilter 70 is arranged in use to scrub the recirculating air of odorous emissions resulting from the anaerobic digestion and aerobic
20 composting stages of the sequential composting process prior to exhaustion of the scrubbed recirculating air into the atmosphere.

The apparatus 10 is also provided with a gas storage tank 80 which is interconnected with the first recirculation line 62 by a first storage line 82. The gas storage tank 80 is

arranged in use to receive biogas, predominantly a mixture of methane and carbon dioxide, generated during the anaerobic digestion stage of the sequential decomposition process. It will be understood that the received biogas will have been treated in the de-watering tank 60 prior to storage in the gas storage tank 80.

5 The gas storage tank 80 is interconnected with a power generator 85 by a generator line 84. The power generator 85 is arranged to convert the biogas to electrical power, wherein the electrical power may be distributed to other components of the apparatus 10 as required. Any excess electrical power generated by the generator 85 could be delivered to an external power grid.

10 As shown in Figure 1, the apparatus 10 also includes a water heater tank 90. The water heater tank 90 is interconnected with the de-watering tank 60 by the de-watering line 67.

The water heater tank 90 is arranged to receive water from the de-watering tank 60 via the de-watering line 67 and from the second port 66. The water heater tank 90 is also

interconnected with the gas storage tank 80 by a first delivery line 87. The water heater
15 tank 90 is provided with means to convert the biogas received from the first delivery line 87 to heat in order to control the temperature of the water in the water heater tank 90.

It will be understood that water in the water heater tank 90 is maintained at a temperature of 15°C to 75°C. The water is arranged, in use, to be recirculated through the apparatus

10 via the second recirculation line 64, the control line 28 and the feeder lines 26 into the vessel 20 during the anaerobic digestion stage of the sequential decomposition process.

20 Delivery of water heated to a temperature range at which anaerobic microbial activity is optimised assists the anaerobic digestion stage of the sequential decomposition process.

As shown in Figure 1, the apparatus 10 also includes a water storage tank 92. The water storage tank 92 is connected to the second recirculation line 64. The water storage tank 92 is arranged to receive and store water extracted from the vessel 10 after completion of the anaerobic digestion stage of the sequential decomposition process.

- 5 The apparatus 10 is also provided with a heat exchange means 95 which is connected with the gas extraction line 50. The heat exchange means 95 is arranged in use to utilise energy from hot air extracted during the aerobic composting stage. The energy from the extracted hot air is used to heat water flowing through the second recirculation line 64. It will be appreciated that the extracted hot air may also be recirculated through the
- 10 apparatus 10 via the first recirculation line 62, the control line 28 and the feeder lines 26 into the vessel 20 before the commencement of the anaerobic digestion stage in order to heat the organic waste material therein. Preheating the organic waste material to a temperature range of between 15°C and 75°C at which anaerobic microbial activity is optimised assists the anaerobic digestion stage of the sequential decomposition process.
- 15 It will be understood that the heat exchange means 95 operates most efficiently when included in a plant where a plurality of vessels 10 are configured in a sequential batch configuration.

In Figure 2 of the accompanying drawings there is shown an apparatus 100 including a plurality of vessels 20 as described in Figure 1 wherein like numerals and symbols refer

20 to like parts throughout. The vessels 20 are interconnected with one another by the first and second recirculation lines 62 and 64

In addition to the functions of the first recirculation line 62 previously described in relation to Figure 1, the first recirculation line 62 is also arranged to facilitate

recirculation of gas extracted from one vessel 20 to the control line 28 and feeder lines 26 of another vessel 20. For example, hot air extracted from one vessel undergoing the aerobic composting stage can be recirculated to another vessel 20 which may require heat to initiate the aerobic composting stage. Alternatively, the organic waste material housed by another vessel 20 may be heated by the recirculated hot air before commencement of the anaerobic digestion stage in that vessel 20.

In addition to the functions of the second recirculation line 64 previously described in relation to Figure 1, the second recirculation line 64 is arranged to facilitate recirculation of water removed from one vessel 20 to the control line 28 and feeder lines of another vessel 20. For example, water removed from one vessel 20 after completion of the anaerobic digestion stage can be recirculated to another vessel 20 which may require an increased water content to commence the anaerobic digestion stage.

It will be appreciated that the contents of each vessel 20 may be at varying stages of the sequential decomposition process. Preferably, each vessel 20 is configured to form a sequential batch to facilitate continuous operation of the sequential decomposition process of the present invention.

A multiple vessel system is configured such that one vessel 20 is filled with organic waste material while another is being emptied, the remaining vessels 20 in the multiple vessel system 100 being arranged to be at various stages of the sequential decomposition process.

It will also be appreciated that additional vessels 20 may be interconnected to the apparatus 100 by the first and second recirculation lines 62 and 64 to increase processing volumes of the apparatus 100.

As shown in Figure 2, there is provided a gas extraction line 52 for air removed from each vessel 20 during the aerobic composting stage, and an additional gas extraction line 52a for the extraction of biogas from the contents of each vessel 20 which are generated during the anaerobic digestion stage.

- 5 The sequential decomposition process of organic waste material will now be described with reference to the apparatus 10 as shown in Figure 1 and the apparatus 100 as shown in Figure 2.

The sequential decomposition process of organic waste material is a two stage process including an anaerobic digestion stage followed by an aerobic composting stage.

- 10 Preferably, the organic waste material undergoes a preliminary aerobic composting pre-conditioning stage followed by a preliminary digestion pre-conditioning stage before commencement of the anaerobic digestion stage and the aerobic composting stage.

- The organic waste material is typically sized and mixed to effect a substantially homogenous mixture. It is understood that organic waste material refers to solid organic waste material, comprising vegetable matter; household and municipal organic waste, including cellulosic material such as waste paper; industrial organic waste; and agricultural organic waste, for example animal manures. Typically, the C:N ratio of the organic waste material is greater than 20. Consistency of the material is preferably optimised for optimum water flow through the contents in the vessel 20 during the preliminary anaerobic digestion pre-conditioning stage and the anaerobic digestion stage, and optimum air flow through the contents in the vessel 20 during the preliminary aerobic composting pre-conditioning stage and the aerobic composting stage. The receival hatch 24 of the vessel 20 is opened, and the auger loader 30 and belt conveyor 40

deliver the homogenised waste material into the vessel 20 until the vessel 20 is substantially full. The receival hatch 24 is then closed to seal the vessel 20.

The preliminary aerobic composting pre-conditioning stage comprises the steps of:

- 1) adjusting the moisture content of the waste material to 40-60% of the wet weight (w/w);
- 2) pumping air into waste material in the vessel 20; and
- 3) decomposition of the waste material by aerobic bacteria.

Water from an external source at the second port 66 is pumped by the second pump 63 through the second recirculation line 64 and into the vessel 20 via the control line 28 and the feeder lines 26. The feeder lines 26 evenly distribute the water through the organic waste material such that the moisture content of the waste material ranges from 40-60% wet weight (w/w) throughout the contents of the vessel 20. Alternatively, the moisture content may be adjusted prior to loading the vessel 20 with the waste material.

Air from an external source at the first port 65 is then pumped under pressure within the range 1-1000 kPa above atmospheric pressure by the first pump 61 through the first recirculation line 62 of the apparatus 10 and into the vessel 20 via the control line 28 and the feeder lines 26. The feeder lines 26 evenly distribute the air through the organic waste material such that the organic waste material is substantially evenly aerated.

It will be appreciated that initially during the preliminary aerobic pre-conditioning composting stage air is optionally extracted from the headspace in the vessel 20 between the organic waste material and the uppermost wall 22 of the vessel 20, via the gas extraction line 50. The extracted air may optionally have water removed therefrom in the

de-watering tank 60 before the air is pumped through the first recirculation line 62 by the first pump 61 back into the vessel 20.

Alternatively, air extracted by the means described above may be sourced from another vessel 20.

- 5 Under the conditions described above, indigenous aerobic bacteria present in the organic waste material begin to metabolise and break down the organic waste material. The preliminary aerobic composting pre-conditioning stage operates in a temperature range of 15°C to 75°C for a period between 1 to 28 days.

The purpose of the preliminary aerobic composting pre-conditioning stage is to raise the
10 temperature of the contents of the vessel 20 to a temperature within a range of 15°C - 75°C, preferably over 50°C. The temperature range of 15°C - 75°C is a preferred range in which the preliminary anaerobic digestion pre-conditioning stage and the anaerobic digestion stage proceeds at optimum efficiency. In this way, the present invention avoids the necessity of reliance on a fuel driven heating means to raise the temperature of the
15 contents within the vessel 20 to the optimal temperature for commencement of the preliminary anaerobic digestion pre-conditioning stage and/or the anaerobic digestion stage.

Preferably, the preliminary aerobic composting pre-conditioning stage comprises creating conditions under which the contents of the vessel 20 undergoes aerobic composting.

- 20 Heat generated by the aerobic composting of the contents of the vessel 20 raises the ambient temperature thereof to a temperature range of 15°C - 75°C at which point the

conditions within the vessel 20 are changed by an operator such that the preliminary anaerobic digestion pre-conditioning stage or the anaerobic digestion stage commences.

It will be understood that other suitable alternative means to raise the temperature of the contents of the vessel 20 may be substituted for the preliminary aerobic composting pre-

5 conditioning stage. For example, heated air or steam from a convenient accessible geothermal source may be pumped into the contents of the vessel 20 to raise the temperature therein to the desired range for commencement of the preliminary anaerobic digestion pre-conditioning stage. Alternatively, referring to the apparatus 100 in Figure 2, heated air extracted from a vessel 20 in which the contents are undergoing the aerobic
10 composting stage may be re-circulated to another vessel 20 via the first recirculation line 62 in order to heat the contents of that vessel 20 to a desired temperature range.

The preliminary anaerobic digestion pre-conditioning stage comprises the steps of:

- 1) sealing the vessel 20 to prevent ingress of air into the vessel 20; and
- 2) depletion of oxygen in the sealed vessel 20.

15 The vessel 20 is sealed when the temperature of the contents of the vessel 20 is in the range of 15°C - 75°C, preferably greater than or equal to 50°C. It is well understood that temperatures in the range of 15°C - 75°C are desirable for anaerobic digestion operating conditions. The vessel 20 is sealed by ceasing to pump and/or circulate air through the feeder lines 26 and the control line 28 to the vessel 20.

20 Oxygen levels will eventually be depleted in the sealed vessel 20 by action of the aerobic bacteria therein. Typically, the metabolic processes of the aerobic bacteria converts the oxygen to carbon dioxide. When the oxygen levels in the vessel 20 are sufficiently

depleted, the anaerobic digestion stage of the sequential decomposition process commences.

The purpose of the preliminary anaerobic digestion pre-conditioning stage is to facilitate the depletion of oxygen inside the vessel prior to addition of an anaerobic inoculum and
5 the commencement of the anaerobic digestion stage.

Biogas is produced at the commencement of and during the anaerobic digestion stage. A mixture of methane and oxygen in the vessel 20 would provide a combustible and potentially explosive gas mixture. Furthermore, the introduction of an anaerobic innoculum into a vessel 20 having a moderate to high oxygen level would prove fatal to
10 the anaerobic inoculum since most anaerobic bacteria are intolerant to oxygen.

Thus, it is an advantage of the preliminary anaerobic digestion pre-conditioning stage to deplete oxygen levels in the sealed vessel 20 before commencement of the anaerobic digestion stage.

When the oxygen level drops to below accepted standards the anaerobic digestion stage
15 of the sequential decomposition process can commence.

The anaerobic digestion stage comprises the steps of:

- 1) adjusting the moisture content of the waste material to 50-95% wet weight (w/w);
and
- 2) digestion of the waste material by anaerobic bacteria.

20 Water from an external source at the second port 66 is received through the second recirculation line 64 and pumped by the second pump 63 into the vessel 20 via the control line 28 and the feeder lines 26. The feeder lines 26 evenly distribute the water through the organic waste material such that the moisture content of the waste material

ranges from 50-95% wet weight (w/w) throughout the contents of the vessel 20. It will be appreciated that the water from the external source may have been mixed with a bio-sludge to act as an anaerobic bacterial inoculum. Alternatively, water removed from another vessel 20 which has undergone the anaerobic digestion stage may be recirculated by the second recirculation line 64 into the present vessel 20. In this way, process water from one anaerobic digestion can be used to inoculate the contents of an interconnected vessel 20 undergoing the anaerobic digestion stage in a multiple vessel system 100.

The anaerobic digestion stage operates in a mesophilic to thermophilic temperature range between 15°C -75°C, preferably over 50°C for a period between 4 to 20 days.

10 Methane and carbon dioxide gases are generated during the anaerobic digestion stage. They are extracted under pressure through the gas extraction line 50 and delivered to the de-watering tank 60 where water is removed from the extracted gases. The extracted gases are then delivered through the first recirculation line 62 to the gas storage tank 80 via the first storage line 82. The gas may then be converted to electrical power by the power generator 85, or alternatively, used to heat water in the water heater tank 90.

15 The water which is removed from the extracted gases in the de-watering tank 60 is then delivered to the heater tank 90 by the de-watering line 67. The water may be heated in the water heater tank 90. The heated water may also be recirculated by the second recirculation line 64, the control line 28 and the feeder lines 26 back into the vessel 20 for a subsequent anaerobic digestion stage, of another batch of organic waste material. In this way the heat and electricity indirectly generated by the anaerobic digestion stage can be utilised to subsidise energy requirements in interconnected vessels 20 or used in

subsequent stages of the sequential decomposition process occurring at a later time in the same vessel 20. It has been found that during the anaerobic digestion stage the amount of volatile solids is reduced and nitrogen content in the contents of the vessel 20 is concentrated.

- 5 Following completion of the anaerobic digestion stage conditions within the vessel 20 are altered such that the aerobic composting stage may commence.

The aerobic composting stage comprises the steps of:

- 1) reducing moisture content within the vessel; and
- 2) aerating the contents of the vessel.

- 10 Excess water is removed from the vessel 20 via the feeder lines 26 and the control line 28 under gravity drainage combined with application of a negative pressure to draw excess water into the second recirculation line 64. Thus, the moisture content of the contents within the vessel 20 is adjusted to 40 to 60% w/w. It will be appreciated that the moisture content can also be lowered to the desired range by pumping warm air sourced
- 15 from another vessel 20 in a multiple vessel system 100 undergoing aerobic composting through the control line 28 and the feeder lines 26 into the vessel 20. The excess water is recirculated into the water storage tank 92. Alternatively, the excess water may be recirculated by the second recirculation line 64 into another vessel 20 in a multiple vessel system 100 whose contents are about to undergo the anaerobic digestion stage.

- 20 The contents of the vessel 20 are aerated by pumping air through the control line 28 and the feeder lines 26 into the vessel 20. It will be appreciated that the conditions for the aerobic composting stage are the same as for the preliminary aerobic composting pre-conditioning stage described previously.

Adjustment to the operating parameters may be made by dosing the vessel contents through the second port 66 as previously described.

It will be appreciated that heat generated from the aerobic composting stage may be used to facilitate the formation of mesophilic to thermophilic conditions for an anaerobic digestion stage or an aerobic composition stage occurring in another interconnected vessel 20.

Upon completion of the aerobic composting stage, the resulting compost will be deposited from the vessel 20 through the extraction hatch 27, loaded and packed for sale.

The resulting compost is relatively dry and has little odour. Nitrogen content in the resulting material is fixed as ammonium. Typically, the C:N ratio of the resulting compost is ≤ 20 .

The present invention will now be further illustrated with reference to the following Example.

EXAMPLE

Organic waste material consisting of shredded newspaper (6.75kg), shredded cardboard (6.75kg), grass clippings (4.4kg), garden waste (30.4kg) and chicken manure (38.3 kg) was blended and received in a 0.8m³ vessel. The C:N ratio of the organic waste material was 25.6.

The contents of the vessel were subjected to a preliminary aerobic composting pre-conditioning stage wherein air was administered to the contents of the vessel at a flow rate of 300L/hr. Interior air pressure inside the vessel was maintained at 25kPa above

atmospheric pressure. The temperature of the contents of the vessel rose to 52°C after a period of three days, whereupon the administration of air to the contents of the vessel was discontinued.

The contents of the vessel were then subjected to conditions under which anaerobic digestion occurs. A liquid digestate derived from an earlier anaerobic digestion of a previous batch of organic waste material was delivered to the vessel. Recirculation of the liquid digestate through the vessel was operated continuously for a period of 8 days. Biogas was generated after a short period. The volume of biogas generated during the anaerobic digestion stage peaked at about 9 m³/m³.day with an average production rate of 7 m³/m³.day. The average methane content of the biogas varied from 40-60%.

Following anaerobic digestion, the liquid digestate was drained from the vessel and air was administered to the vessel at a flow rate of 150L/hr. Interior air pressure inside the vessel was maintained at 25kPa above atmospheric pressure. Conditions for aerobic composting were maintained for five days.

After five days the resulting compost was removed from the vessel. Internal temperatures of the compost were monitored for four consecutive days to assess the stability of the compost. The internal temperature did not exceed 24°C, thus indicating desired stability.

The compost was analysed for key parameters corresponding to requirements of Australian Standards AS 4454-2000 *Composts, Soil Conditioners and Mulches*. The results and comparative results are shown in the following Table. The C:N ratio of the resulting compost was 19.

Table

Characteristic (units)	AS 4454-2000 requirements	Compost
P (% dry mass)	N/A	0.6
Nitrogen-ammonium (mg/L in extract)	<300	170
Nitrogen-nitrate (mg/L in extract)	>100 (if plant nutrition claimed)	175
Total N (% dry matter)	≥ 0.8 if plant nutrition claimed	1.3
C:N ratio	<20	19
Total C (% dry matter)	≥ 25	25
Temperature	$\leq 40^{\circ}\text{C}$ for four days	23°C

Modifications and variations as would be apparent to a skilled addressee are deemed to

5 be within the scope of the present invention.

CLAIMS

1. An organic waste material treatment process for organic waste material received in a vessel comprising the steps of:

- a) displacing air in the vessel and contents thereof with water to create conditions
5 suitable for anaerobic digestion of the contents to proceed;
- b) anaerobically digesting the contents of the vessel;
- c) separating gaseous byproducts from residues resulting from step b);
- d) removing at least a portion of the water from the vessel;
- e) administering air to the residues in the vessel to create conditions suitable for
10 aerobic composting of the residues to proceed;
- f) aerobically composting the residues by action of aerobic bacteria; and
- g) recovering compost resulting from step f) from the vessel.

2. The organic waste material treatment process according to claim 1, characterised in that the temperature of the contents of the vessel is between 15 - 75 °C before
15 commencement of step a).

3. The organic waste material treatment process according to claim 2, characterised in that the temperature of the contents of the vessel is raised to at least 50 °C before commencement of step a).

4. The organic waste material treatment process according to claim 2, characterised
20 in that the temperature of the contents of the vessel is raised to between 15 - 75 °C before commencement of step a) by subjecting the contents of the vessel to conditions under which aerobic composting of the contents of the vessel will proceed.

5. The organic waste material treatment process according to claim 3, characterised in that the temperature of the contents of the vessel is raised to at least 50 °C before commencement of step a) by subjecting the contents of the vessel to conditions under which aerobic composting of the contents of the vessel will proceed.
6. The organic waste material treatment process according to claim 4 or claim 5, characterised in that air is administered to the contents of the vessel before commencement of step a).
7. The organic waste material treatment process according to claim 6, characterised in that air is administered to the contents of the vessel at a pressure of between 1-1000kPa above atmospheric pressure to ensure even penetration of the contents of the vessel by the air.
8. The organic waste material treatment process according to claim 7, characterised in that air is administered to the contents of the vessel at a pressure of between 5 - 50 kPa above atmospheric pressure to ensure even penetration of the contents of the vessel by the air.
9. The organic waste material treatment process according to claim 7 or claim 8, characterised in that air is administered to the contents of the vessel at about 25 kPa above atmospheric pressure
10. The organic waste material treatment process according to any one of claims 2 to 9, characterised in that water is added to the contents of the vessel to adjust a moisture content of the contents of the vessel to between about 40 - 60 % wet weight (w/w) before commencement of step a).

11. The organic waste material treatment process according to any one of claims 2 to 10, characterised in that oxygen in the vessel is depleted after the temperature of the contents of the vessel has been allowed to rise to between 15 - 75 °C before commencement of step a).
- 5 12. The organic waste material treatment process according to claim 11, characterised in that oxygen in the vessel is depleted after the temperature of the contents of the vessel has been allowed to rise to at least 50 °C before commencement of step a).
13. The organic waste material treatment process according to claim 11 or claim 12, characterised in that oxygen in the vessel is depleted by sealing the vessel and
10 ceasing administration of air to the contents of the vessel, thereby providing no further oxygen reserves for aerobic bacteria therein, thus causing the aerobic bacteria to consume the oxygen remaining in the vessel.
14. The organic waste material treatment process according to any one of claims 1 to 13, characterised in that an anaerobic bacterial inoculum is added to the contents
15 of the vessel to facilitate anaerobic digestion of the contents of the vessel.
15. The organic waste material treatment process according to any one of claims 1 to 14, characterised in that the temperature of the contents of the vessel is between about 15 - 75 °C to facilitate anaerobic digestion of the contents of the vessel in step b).
- 20 16. The organic waste material treatment process according to claim 15, characterised in that the temperature of the contents of the vessel is at least 50 °C to facilitate anaerobic digestion of the contents of the vessel.

17. The organic waste material treatment process according to any one of claims 1 to 16, characterised in that air is administered to the residues at a pressure of between 1-1000 kPa above atmospheric pressure to ensure even penetration of the residues by the air, thereby facilitating aerobic composting of the residues in step e).

18. The organic waste material treatment process according to claim 17, characterised in that air is administered to the residues at a pressure of between 5 - 50 kPa above atmospheric pressure to ensure even penetration of the residues by the air, thereby facilitating aerobic composting of the residues.

19. The organic waste material treatment process according to claim 17 or claim 18, characterised in that air is administered to the residues at a pressure of about 25 kPa above atmospheric pressure to ensure even penetration of the residues by the air, thereby facilitating aerobic composting of the residues.

20. The organic waste material treatment process according to any one of claims 1 to 19, characterised in that the portion of water removed from the vessel in step d) results in a moisture content of the residues of between 40 - 60 % wet weight (w/w).

21. The organic waste material treatment process according to any one of claims 1 to 20, characterised in that the gaseous byproducts separated from the residues in step c) include methane.

22. The organic waste material treatment process according to any one of claims 1 to 21, characterised in that the compost resulting from step f) has been aerobically stabilised.

23. An organic waste material treatment process for organic waste material received in a plurality of interconnected vessels comprising the steps of:

- a) displacing air in at least one of the vessels and contents thereof with water received from an interconnected vessel to create conditions suitable for anaerobic digestion of the contents to proceed in the or each vessel, the contents of the interconnected vessel having already undergone anaerobic digestion;
- b) anaerobically digesting the contents of the or each vessel;
- c) separating gaseous byproducts from residues resulting from step b);
- d) removing at least a portion of the water from the or each vessel and transferring the portion of the water to another interconnected vessel for use in step a);
- e) administering air to the residues in the or each vessel to create conditions suitable for aerobic composting of the residues to proceed;
- f) aerobically composting the residues; and
- g) recovering compost resulting from step f) from the or each vessel.

24. The organic waste material treatment process according to claim 23, characterised in that the temperature of the contents of the or each vessel is between 15 - 75 °C before commencement of step a).

25. The organic waste material treatment process according to claim 24, characterised in that the temperature of the contents of the or each vessel is raised to at least 50 °C before commencement of step a).

26. The organic waste material treatment process according to claim 24, characterised in that the temperature of the contents of the or each vessel is raised to between 15 -75 °C before commencement of step a) by subjecting the contents of the or

each vessel to conditions under which aerobic composting of the contents of the or each vessel will proceed.

27. The organic waste material treatment process according to claim 25, characterised in that the temperature of the contents of the or each vessel is raised to at least 50 °C before commencement of step a) by subjecting the contents of the or each vessel to conditions under which aerobic composting of the contents of the or each vessel will proceed.

28. The organic waste material treatment process according to claim 26 or claim 27, characterised in that air is administered to the contents of the or each vessel before commencement of step a).

29. The organic waste material treatment process according to claim 28, characterised in that air is administered to the contents of the or each vessel at a pressure of between 1-1000 kPa above atmospheric pressure to ensure even penetration of the contents of the or each vessel by the air.

30. The organic waste material treatment process according to claim 29, characterised in that air is administered to the contents of the or each vessel at a pressure of between 5 - 50 kPa above atmospheric pressure to ensure even penetration of the contents of the or each vessel by the air.

31. The organic waste material treatment process according to claim 29 or claim 30, characterised in that air is administered to the contents of the or each vessel at about 25 kPa above atmospheric pressure

32. The organic waste material treatment process according to any one of claims 23 to 31, characterised in that water is added to the contents of the or each vessel to

adjust a moisture content of the contents of the or each vessel to between 40 - 60 % wet weight (w/w) before commencement of step a).

33. The organic waste material treatment process according to any one of claims 23 to 32, characterised in that oxygen in the or each vessel is depleted after the temperature of the contents of the or each vessel has been allowed to rise between 15 - 75 °C before commencement of step a).

34. The organic waste material treatment process according to claim 33, characterised in that oxygen in the or each vessel is depleted after the temperature of the contents of the or each vessel has been allowed to rise to at least 50 °C before commencement of step a).

35. The organic waste material treatment process according to claim 33 or claim 34, characterised in that oxygen in the or each vessel is depleted by sealing the or each vessel and ceasing administration of air to the contents of the or each vessel, thereby providing no further oxygen reserves for aerobic bacteria therein, thus causing the aerobic bacteria to consume the oxygen remaining in the or each vessel.

36. The organic waste material treatment process according to any one of claims 24 to 35, characterised in that an anaerobic bacterial inoculum is added to the contents of the or each vessel to facilitate anaerobic digestion of the contents of the or each vessel.

37. The organic waste material treatment process according to any one of claims 24 to 36, characterised in that the temperature of the contents of the or each vessel is

between 15 - 75 °C to facilitate anaerobic digestion of the contents of the or each vessel in step b).

38. The organic waste material treatment process according to claim 37, characterised in that the temperature of the contents of the or each vessel is at least 50 °C to facilitate anaerobic digestion of the contents of the or each vessel.

39. The organic waste material treatment process according to any one of claims 24 to 38, characterised in that air is administered to the residues at a pressure of between 1-1000 kPa above atmospheric pressure to ensure even penetration of the residues by the air, thereby facilitating aerobic composting of the residues in step e).

40. The organic waste material treatment process according to claim 39, characterised in that air is administered to the residues at a pressure of between 5 -50 kPa above atmospheric pressure to ensure even penetration of the residues by the air, thereby facilitating aerobic composting of the residues.

41. The organic waste material treatment process according to claim 39 or claim 40, characterised in that air is administered to the residues at a pressure of about 25 kPa above atmospheric pressure to ensure even penetration of the residues by the air, thereby facilitating aerobic composting of the residues.

42. The organic waste material treatment process according to any one of claims 24 to 41, characterised in that the portion of water removed from the or each vessel in step d) results in a moisture content of the residues of between 40 - 60 % wet weight (w/w).

43. The organic waste material treatment process according to any one of claims 24 to 42, characterised in that the gaseous byproducts separated from the residues in step c) include methane.
44. The organic waste material treatment process according to any one of claims 24 to 43, characterised in that the compost resulting from step f) has been aerobically stabilised.
45. A vessel for anaerobic digestion and aerobic composting of organic waste material comprising a means for receiving organic waste material, first feed means for supplying water to the vessel and second feed means for supplying air to the vessel, wherein the first and second feed means are arranged to evenly distribute water and air to the organic waste material; the vessel being devoid of any internal agitation means.
46. The vessel according to claim 45, characterised in that the first and second feed means include a plurality of feeder lines disposed in at least one wall of the vessel to facilitate the supply of air and water evenly to the organic waste material.
47. The vessel according to claim 45, characterised in that the first and second feed means includes at least one elongate perforated lance depending from an uppermost wall or a lowermost wall of the vessel to facilitate the supply of air and water evenly to the organic waste material.
48. The vessel according to any one of claims 45 to 47, characterised in that the vessel is provided with a gas extraction line to extract gases generated in the interior of the vessel during anaerobic digestion of the organic waste material or

to extract surplus gases upon completion of aerobic composting of the organic waste material.

49. The vessel according to any one of claims 45 to 48, characterised in that the vessel is constructed to withstand internal pressures of between about 1-1000 kPa above atmospheric pressure.

50. The vessel according to any one of claims 45 to 49, characterised in that the second feed means supplies pressurised air to the vessel in a range of between about 1-1000 kPa above atmospheric pressure such that the pressurised air evenly penetrates the organic waste material.

51. The vessel according to claim 50, characterised in that the second feed means supplies pressurised air to the vessel in a range of between about 5 - 50 kPa above atmospheric pressure such that the pressurised air evenly penetrates the organic waste material.

52. The vessel according to claim 50 or claim 51, characterised in that the second feed means supplies pressurised air to the vessel at about 25 kPa above atmospheric pressure.

53. The vessel according to any one of claims 45 to 52, characterised in that the vessel is provided with a drainage means to remove at least a portion of water supplied to the vessel by the first feed means.

54. An apparatus arranged, in use, to facilitate an organic waste material treatment process as claimed in any one of claims 1 to 44, comprising at least one vessel for sequential anaerobic digestion and aerobic composting of organic waste material as claimed in any one of claims 45 to 53, a first recirculation means for

recirculating gases extracted from the or each vessel to a first storage means, and a second recirculation means for recirculating water extracted from the or each vessel to a second storage means or an interconnected vessel, wherein the organic waste material in the interconnected vessel is undergoing anaerobic digestion.

- 5 55. The apparatus according to claim 54, characterised in that the first storage means is a gas storage tank for storing biogas extracted during anaerobic digestion of the organic waste material in the or each vessel.
56. The apparatus according to claim 54 or claim 55, characterised in that the second storage means is a water storage tank for storing water extracted after anaerobic
10 digestion of the organic waste material in the or each vessel.
57. The apparatus according to claim 56, characterised in that water stored in the water storage tank is recirculated to the interconnected vessel by the second recirculation means, wherein the organic waste material in the interconnected vessel is undergoing anaerobic digestion.
- 15 58. The apparatus according to claim 56, characterised in that water stored in the water storage tank is subsequently recirculated back to the vessel by the second recirculation means, wherein a subsequent batch of organic waste material is undergoing anaerobic digestion.
59. The apparatus according to any one of claims 54 to 58, characterised in that the
20 first recirculation means is interconnected to a dewatering tank, the dewatering tank being arranged, in use, for removal of water from the extracted gases.
60. The apparatus according to claim 59, characterised in that the dewatering tank is interconnected to the second recirculation means for recirculating the water

removed from the extracted gases to the second storage means or the interconnected vessel.

61. The apparatus according to any one of claims 54 to 60, characterised in that the second storage means is provided with a heating means for heating water stored in the second storage means, the heating means being interconnected by the first recirculation means to the gas storage tank, such that, in use, methane gas stored in the gas storage tank is utilised by the heating means to transfer heat to the water stored in the second storage means.

62. The apparatus according to any one of claims 54 to 61, characterised in that the first recirculation means is interconnected to a heat exchange means, the heat exchange means being arranged, in use, to facilitate transfer of heat energy from hot air extracted from the or each vessel, wherein the organic waste material in the or each vessel is undergoing aerobic composting.

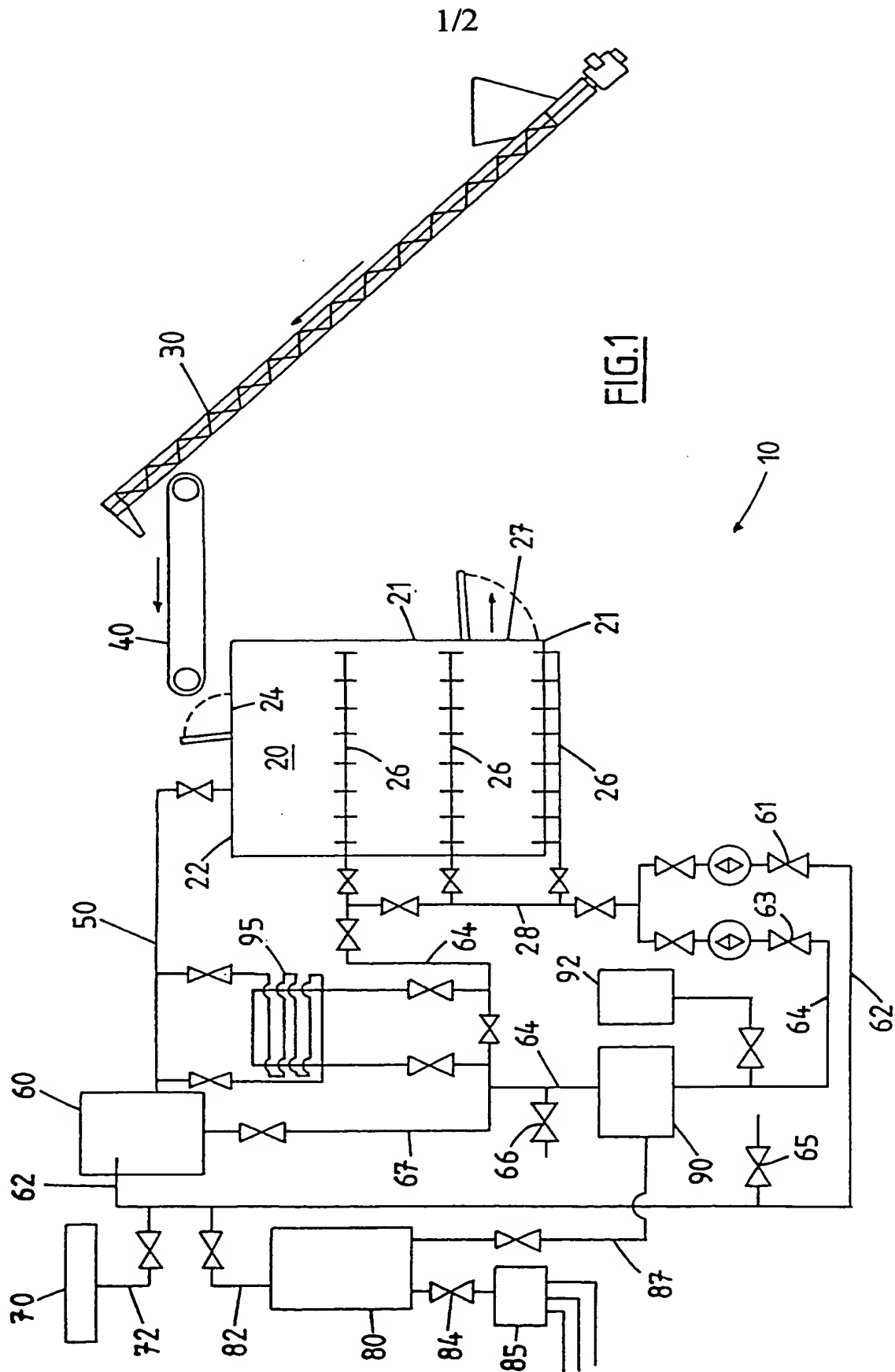


FIG. 1

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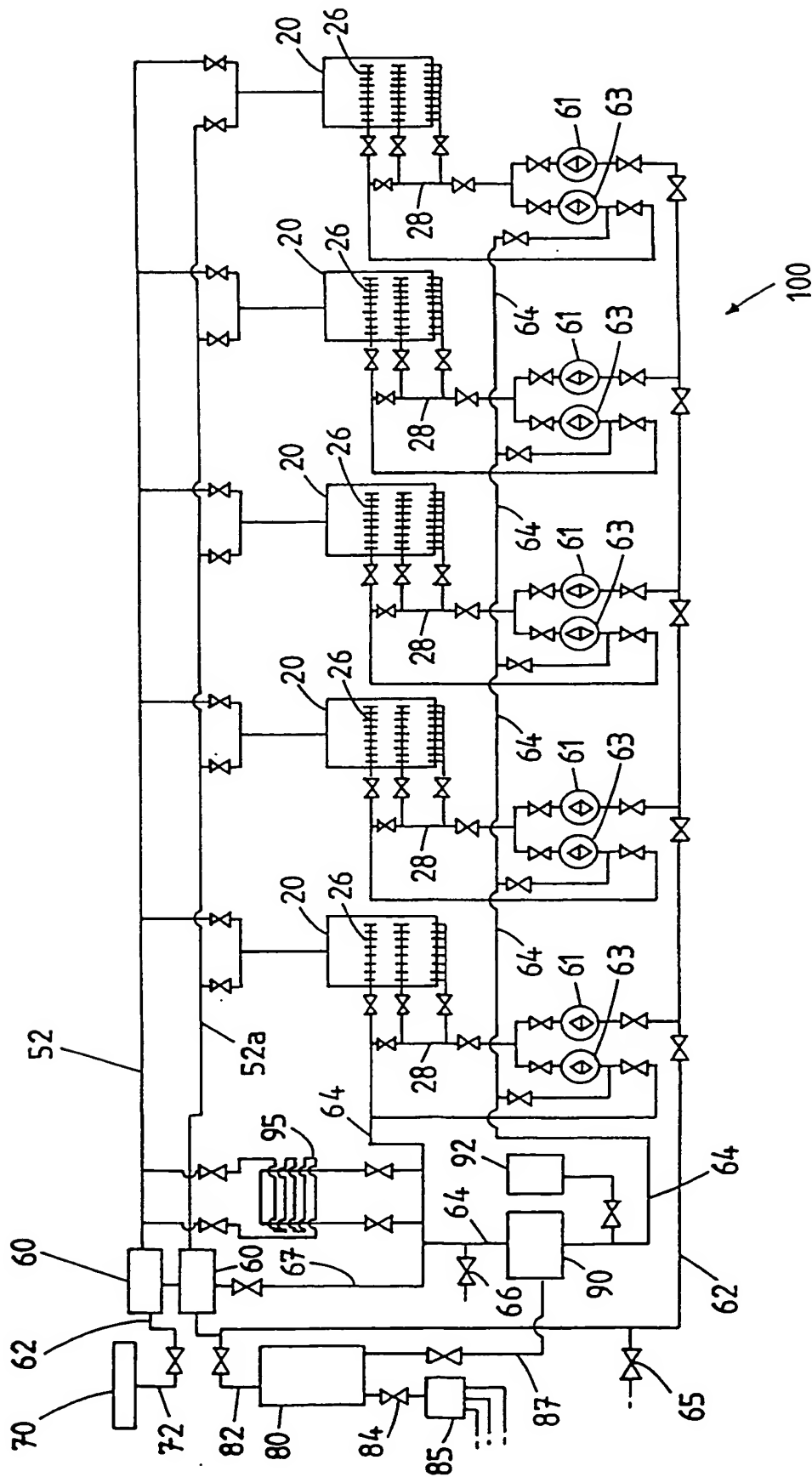


FIG. 2

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU00/00865

A. CLASSIFICATION OF SUBJECT MATTERInt. Cl. ⁷: C05F 17/00, 17/02; C02F 3/30

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

ORBIT: FILE WPAT. SEARCH TERMS: 1. C02F 3/30

2. C05F+ANAEROBIC+AEROBIC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 755905 (Bertolotto, A) 29 January 1997 See whole document	1-62
X	Derwent Abstract Accession No 98-571533/49, Class D15, JP 10-249386 (NGK Insulators Ltd) 22 September 1998	1-62
X	Derwent Abstract Accession No 99-012790/02, Class D15, JP 10-277585 (Matsushita Electric Works Ltd) 20 October 1998	1-62

☒ Further documents are listed in the continuation of Box C
 ☒ See patent family annex

* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed		"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family
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Date of the actual completion of the international search

22 August 2000

Date of mailing of the international search report

6 SEP 2000

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU00/00865

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	Derwent Abstract Accession No. 95-363083/47, D15, JP 07-246395 (ZH Nihon Nogyo Shuraku Haisui Kyokai) 26 September 1995	1-62

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/AU00/00865

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member	
EP	755905	IT	1279184
END OF ANNEX			